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Center for Research in Economics, Management and the Arts

Early COVID-19 Government Communication is Associated with Reduced Interest in the QAnon Conspiracy Theory

Working Paper No. 2021-12

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Early COVID-19 Government Communication is Associated with Reduced Interest in the QAnon Conspiracy Theory

Ho Fai Chan^{1,2}, Stephanie M. Rizio^{3,4}, Ahmed Skali³, and Benno Torgler^{1,2,5}

March 2021

Abstract

The QAnon conspiracy theory contends, among other things, that COVID-19 is a conspiracy orchestrated by powerful actors and aimed at repressing civil liberties. We hypothesize that, where government risk communication started early, as measured by the number of days between the start of the communication campaign and the first case in the country, citizens are less likely to turn to conspiratorial explanations for the pandemic. In Study 1, we find strong support for our hypothesis in a global sample of 111 countries, using daily Google search volumes for QAnon as a measure of interest in QAnon. The effect is robust to a variety of sensitivity checks. In Study 2, we show that the effect is not explainable by pre-pandemic cross-country differences in interest in QAnon, nor by ‘secular’ rising interest in QAnon amid the pandemic. When evaluated against pre-pandemic levels of interest in QAnon, we find that a one standard deviation (26.2 days) increase in communication lateness predicts a near-tripling (172 percentage points) increase in interest in QAnon (Study 2). In pre-registered Study 3, we find no support for the proposition that early communication reduces self-reported pandemic-related conspiratorial ideation in a sample of respondents from 67 countries. The latter non-result appears to be partially driven by social desirability bias (Study 4). Overall, our results provide evidence that very extreme beliefs like QAnon are highly responsive to government risk communication, while less extreme forms of conspiracism are perhaps less so.

Keywords: conspiracy theories; QAnon; COVID-19; coronavirus; government risk communication

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Introduction

The rapid spread of the highly contagious and deadly COVID-19 virus, since its emergence in December 2019, has led to a global pandemic, a state of affairs not seen since the 1918 Spanish Flu (see Ashton 2020 for a comparison)¹. Governments around the world communicated with the public about the virus with varying degrees of swiftness: the data from Hale et al. (2020), which we delve into in Study 1, show that there is substantial heterogeneity in how quickly governments began communicating with the public about COVID-19. In this paper, we ask whether the swiftness of government communication can explain the spread of COVID-19 related conspiracy theories.

Our main hypothesis is that, where government communication is slow, there are opportunities for people to ‘fill in the blanks’ with conspiratorial ideas which attempt to rationalize the situation at hand, namely the pandemic. The COVID-19 pandemic is an ideal breeding ground for the spread of false narratives: a sudden environment of extreme angst, frustration, and fear materialized, which in the minds of many people could not have been foreseen, and thus requires an extraordinary explanation. As a matter of fact, apart from the virus itself, a hallmark feature of the COVID-19 pandemic has been the proliferation of conspiracy theories on social media, a pattern which began early on in the pandemic (Van Bavel et al. 2020a). More generally, as shown by the folklorist Jon D. Lee (2014) in his book *An Epidemic of Rumors*, pandemics and epidemics, from AIDS to H1N1 and SARS, commonly give rise to rumours and conspiratorial narratives. Thus, we hypothesize that false narratives spread where governments do not communicate swiftly with the public about the virus.

We test our hypothesis using Google search data as a proxy for interest in the QAnon conspiracy theory in Studies 1 and 2 and find strong support for our hypothesis. Our motivation for studying QAnon is that it is an integral part of what Muirhead and Rosenblum (2020, p. 35) define as the new conspiracism, which is an “active assault on democracy.” QAnon is an extreme conspiratorial belief which is of current policy concern, as the group has been designated a terror threat by the FBI as early as 2019.² Central to QAnon lore is the dangerous belief that the pandemic is a hoax,³ which makes QAnon a phenomenon deserving of empirical investigation. Importantly, the human cost of becoming embroiled in QAnon is also staggering, as evidenced by the stories

¹ For a historical overview on pandemics and their societal relevance, see Snowden (2019). For a detailed look at the Spanish Flu, see Barry (2004).

² The Hill, [“FBI memo warns QAnon poses potential terror threat: report”](#)

³ The New Daily, [“The coronavirus ‘hoax’: Conspiracy peddlers infecting Australians at alarming rate”](#)

of individuals ‘losing’ loved ones to the cult-like nature of QAnon,⁴ which motivates us to study QAnon in Studies 1 and 2. We also test our hypothesis using self-reported conspiratorial beliefs in a sample of approximately 40,000 respondents from 67 countries from the International Collaboration on Moral and Social Psychology (Van Bavel et al. 2020b), in the pre-registered Study 3. Our hypothesis is not supported in Study 3, which may be partially explainable by the usual social desirability bias from which survey responses can suffer (Study 4). At any rate, it is reassuring to observe that not all conspiratorial ideas respond equally largely to government (in)action. Our results provide ample caution about the responsiveness of extreme beliefs, such as QAnon, to government risk communication.

Our work contributes to a well-established area of investigation in psychology and across the social sciences, which is the study of conspiracy theories (for overviews, see van der Linden et al. 2017; Lewandowsky and Cook 2020) and of false beliefs more generally (O’Connor and Weatherall 2019). The phenomena of scapegoating and conspiracy theories ensuing from pandemics have a long history, dating back at least to the plague of Cyprian in Roman times (Retief and Cilliers 2000). Conspiracy theories and false narratives, more generally, tend to circulate more in times of uncertainty or complexity as a way of trying to make sense of what is going on in the world around us, and usually relate to clandestine government plans, elaborate murder plots, or paranoia about powerful groups, thinking they are sinister or have “hidden agendas”, and persist even when there is no decisive evidence for them (Lewandowsky and Cook, 2020). People ‘fill in the gaps’ with their own explanations as a way of relieving feeling of anxiety and stress (Douglas et al. 2017)—even going as far as assigning blame or responsibility to certain individuals or groups to fulfil their epistemic need for an explanation, with the scapegoating of Jews during the Black Death being a salient example. However, with the exception of Sternisko et al. (2020) and Chan et al. (2021), we know little about conspiracy theories in relation to the COVID-19 pandemic, which is our work’s primary contribution.

Our work also contributes to a strand of research in the crisis communication literature, which emphasizes the benefits of communicating early (see, e.g., Coombs and Holladay 2010, Heath and O’Hair 2009). In mock criminal trials, Dolnik et al. (2003) show that revealing damaging information about oneself (a strategy known as ‘stealing thunder’) without waiting for others to reveal it first, is beneficial to the party revealing the information. In an organizational context, Arpan and Roskos-Ewoldsen (2005) show that stealing thunder results in higher credibility ratings for the disclosing organization. Williams and Treadaway (2009) argue that the Exxon corporation’s slow communication response to the grounding of the Exxon Valdez oil tanker in Alaska played

⁴ The Guardian, [“The QAnon orphans: people who have lost loved ones to conspiracy theories”](#)

a driving role in the failure of Exxon’s communication strategy. In the context of health communication, Covello (2003, p. 5) specifically defines as best practice to “demonstrate respect for persons affected by risk management decisions by involving them early, before important decisions are made.” Thus, in the case of the COVID-19 virus outbreak, our findings complement the extant risk communication literature, by showing that early communication about the virus has a chilling effect on the spread of conspiracy theories people turn to in order to ease some of feelings of anxiety and panic arising from the uncertainty about the virus’ nature and spread. To the best of our knowledge, this paper is the first to quantitatively explore crisis communication during COVID-19 (see Malecki et al. 2021 for a discussion).

Study 1

Data

QAnon. We use daily country-level Google search volumes to measure interest in QAnon from January 1 to May 24, 2020. We use the latter as our cut-off date because it is the day before George Floyd was killed by police offices in Minneapolis. Floyd’s killing gave rise to large popular protests, leading at least some QAnon followers to conclude that the protests were staged by a “deep state” to harm Donald Trump’s re-election chances (Chan et al. 2021).

Using Google searches as a proxy for QAnon beliefs follows in the footsteps of Stephens-Davidowitz (2014), who shows that racial animus, as proxied by search terms for the n-word, cost Barack Obama about 4 percentage points of the national popular vote. While we cannot know for certain that searches for QAnon reflect belief in QAnon, Madestam et al. (2013) provide evidence that Google searches are correlated with actual political behaviour. They document rising interest in the Tea Party between 2009 to 2011, as measured by Google searches, which accompanied increased attendance at Tea Party rallies. In SI Figure S5, we also provide evidence that Google searches for Jo Jorgensen, the Libertarian Party candidate to the U.S. presidency, predict votes for Jo Jorgensen at the state level, such that Google searches are indicative of political behaviour.⁵ A major advantage of using Google searches as a proxy for beliefs and attitudes is that Google searches do not suffer from social desirability bias (Stephens-Davidowitz 2014). This is particularly true for sensitive questions, as is the case for conspiratorial beliefs.

⁵ We focus on Jo Jorgensen in this validation exercise as she is the only minor party candidate to be present on the ballot in all states. Google searches for Jorgensen explain as much as 25% of her vote share. Note that we would not expect this pattern to hold for major parties: for example, in Democrat stronghold California, citizens (even politically active ones) are unlikely to spend much time searching for Democratic Party-related topics on the internet.

Google search volumes for a given topic are measured as a share of all Google searches for a given country and date, and range from 0 (date with the least interest) to 100 (date with the most interest). For example, Google searches for the weather in the United States (Figure S1 in the Supplementary Information) are approximately constant for the first two months of 2021 and peak markedly on February 15, which was around the start of winter storm Viola.⁶ Because Google search volumes for QAnon are *relative* to other searches, higher numbers do not mean that people are at home because of the pandemic searching for more of everything. Instead, higher searches for QAnon specifically mean that searches for QAnon are becoming more frequent relative to all other searches. Since each country has data ranging from 0 to 100, and we are interested in cross-country comparisons, we adjust the original data to reflect cross-sectional differences in search volumes between countries. We do so using cross-sectional search intensity from Google trends, which ranks countries from most searches (100) to least (0) for a given time period. Austria is the country which sees the most searches for QAnon and receives a score of 100. We thus leave its time-series data unchanged. The United States has a cross-sectional score of 83, meaning that its searches for QAnon are 83% as large as Austria's; we therefore multiply all daily search volumes for the United States by 0.83, in order to make them comparable with Austria's. We perform this adjustment for all countries in the dataset.

Late Campaign. For a given country, we measure the 'earliness' of government COVID-19 communication as the number of days between the date of the first case of COVID-19 in the country and the date on which government officials began communicating with the public about COVID-19. Both of these variables are drawn from the Oxford COVID-19 Government Response Tracker (OxCGRT; Hale et al. 2020) dataset, the main source of information on governmental responses to the pandemic, from which we also draw several control variables as detailed below. The OxCGRT dataset records the first case of COVID-19 in New Zealand on February 28, 2020; the earliest government communication began on January 22, 2020, thus giving New Zealand a value of value for *Late Campaign* = -37, as their government began communicating 37 days before the first case. Alternatively, we also define another version of *Late Campaign* relative to the first death in the country, rather than relative to the first case. Tables S1 and S2 in the Supplementary Information provides descriptive statistics and definitions and sources, respectively, for all variables used in this paper.

⁶ Weather.com, "[Winter Storm Viola Smashed Records in the South and Brought Snow, Ice Into Northeast](#)"

Sample composition. Our main two variables described above are available for 111 countries and territories. The full list is provided in SI Table S3.

Methods

We estimate the following model via ordinary least squares (OLS):

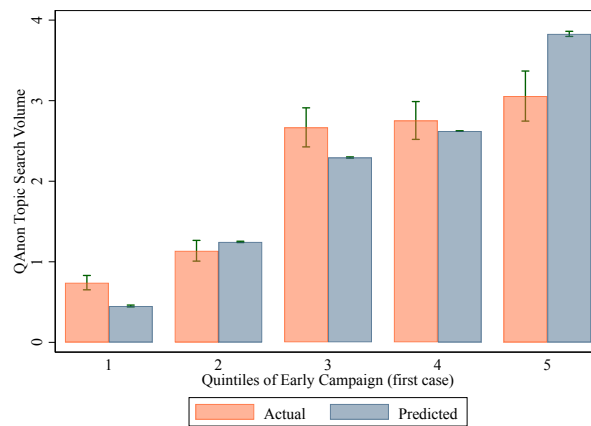
$$QAnon_{it} = \alpha_0 + \alpha_1 Late\ Campaign_i + \mathbf{X}_{it}\gamma + \epsilon_{it} \quad (1)$$

where the dependent variable, $QAnon$, measures the volume of Google searches for the topic of QAnon in country i on day t , α_0 is a constant term, $Late\ Campaign$ is the number of days elapsed between the start date of government COVID-19 communication campaigns and the first case of the virus (or first death from the virus) in the country, \mathbf{X} is a vector of country-level control variables, and ϵ is an error term. Larger values of $Late\ Campaign$ denote a later campaign, which we hypothesize to lead to larger interest in QAnon.

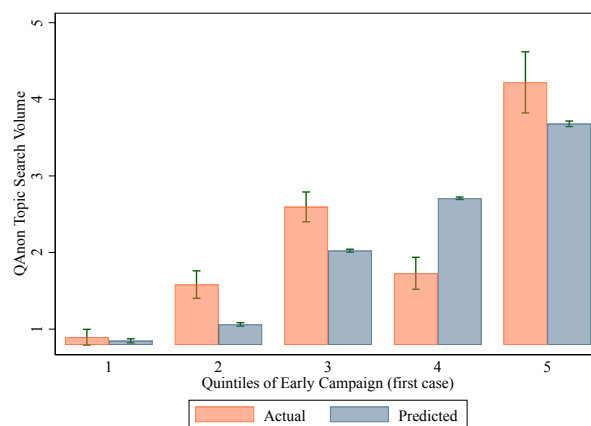
Following recent developments in the statistical literature, we cluster standard errors on the level of the treatment assignment (Abadie et al. 2017). In this case, the treatment assignment is $Late\ Campaign$, which is determined at the country level; we thus cluster standard errors over countries. We also report randomization inference p -values, which relax any distributional assumptions and instead allow us to compare our test statistics to the actual distribution of test statistics in our data. The intuition dates back to Fisher (1935): consider the following thought experiment, with a continuous outcome and a binary treatment. Each observational unit is either treated or not treated: the entire universe of all potential treatment allocations is therefore known. Whereas a t -test compares the observed test statistic to Student's t -distribution, Fisherian randomization inference compares the observed test statistic to the distribution of test statistics that could have been obtained under all possible treatment allocations. In practice, this is achieved by comparing the estimated effect to the distribution of placebo effects. The latter distribution is obtained by generating random values for the variable of interest and estimating Equation (1) with the placebo values. Below, we report p -values for 500 iterations of this procedure; SI Figure S2 depicts how randomization inference is implemented, using model 1 from panel A of Table 1 below as an example.

Results

Figure 1 displays search volumes for QAnon by quintile of *Late Campaign*, as defined relative to the first case of COVID-19 in the country (panel A) or relative to the first death (panel B). We show these relationships both for the raw data (the orange bars) and for the predicted values from a baseline version of Equation (1) without covariates (blue bars). The data indicate that earlier-communication countries have low levels of interest in QAnon, whereas later-communication countries have higher interest in QAnon. Quantitatively, countries in the latest quintile have approximately 3-4 times more QAnon searches than countries in the earliest quintile.



(a) Late campaign relative to first case.



(b) Late campaign relative to first death.

Figure 1. Search volumes for QAnon by quintile of Late Campaign, actual and predicted.

Table 1 presents the main regression results for Study 1. The top panel of the table, Panel A, presents results using the first case of COVID-19 as a reference point against which government communication campaign starts are measured, while Panel B uses the first death as the reference point. Model 1 presents the baseline estimates: a one-day increase in communication lateness is associated with a statistically significant 0.0402 – 0.0565 increase in searches for QAnon. The mean of the dependent variable is 2.05 approximately; the estimated effect therefore represents an increase in the order of 2 to 2.76 percentage points from the mean. Another quantity of interest is the effect of a one-standard deviation (26.2 days) increase in communication lateness, which is associated with a 51 to 72 percentage points increase in searches for QAnon. The effects we estimate are therefore sizable.

Model 2 builds up from Model 1, with the added inclusion of a vector of day fixed effects. These daily dummies control for all unobserved global fluctuations in searches for QAnon. For example, QAnon may have been featured in a prominent news story and thus searched for on some days more than others, owing to reasons completely separate from government communication; day dummies allow us to rule out that such patterns could be driving our results.

In Model 3, we include a full set of continent fixed effects, which play a crucial role in this setting. Continent dummies allow us to rule out the possibility are driven by varying propensities to search for QAnon across geographic regions. It is entirely plausible that European Google users may have googled QAnon more than Asian users; if European countries also tend to have later communication campaigns, then our results from Models 1 and 2 would be confounded in the absence of continent dummies. Our estimates from Model 3 survive the inclusion of continent dummies, and if anything, increase slightly in size. Importantly, the coefficient from Model 3 has a within-continent interpretation: we find that, when comparing two countries within the same continent, the country with the earlier government communication has significantly less search activity for QAnon. In Model 4, we control for both day fixed effects and continent fixed effects; the results are unchanged. In Model 5, we interact day fixed effects with continent fixed effects, thus effectively comparing search behaviour for countries on the same continent and on the same day. The continent-by-day fixed effects also offer the major advantage of controlling for region- and time-specific development in the COVID-19 situation, which might also affect search behaviour. The estimated effects remain large and statistically significant.

Sensitivity

Covariates. In Table 2, we control for an extensive set of factors which might correlate with both searches for QAnon and government’s ability or willingness to implement a quick communication

campaign. In Model 1, we control for 14 variables taken from the International Country Risk Guide (PRS 2018), which capture the quality of the institutional environment. These variables are expert ratings on the quality of the local bureaucracy, corruption, and government stability, among others (see SI Table S1 for variable definitions). Model 2 rules out that differences in economic development are driving the results, by controlling for the natural logarithm of per capita Gross Domestic Product. Model 3 controls for democracy, as measured in the Polity project (Marshall, Gurr and Jagers 2013), which ranges from -10 (full autocracy) to +10 (full democracy). In Model 3, we include an index of human capital from the Penn World Tables (Feenstra, Inklaar and Timmer 2015), since education might impinge on both search behaviour and government policy. Model 5 is concerned with differences in national culture, and thus accounts for those using Schwartz's (2006) seven cultural value orientations. In Model 6, we control for an extensive set of COVID-19-related restrictions; finally, in Model 7, we account for the incidence of COVID-19 by controlling for the natural logarithm of per capita COVID-19 cases. Our estimates for *Late Campaign* remain large and statistically significant throughout.

Table 1. Main results from Study 1. Dependent variable = Google search queries for the QAnon topic. *Late Campaign* is the number of days between the start of government COVID-19 communication campaigns and the first COVID-19 case (Panel A) or death (Panel B) in the country.

	A. Late campaign relative to first COVID-19 case in country				
	(1)	(2)	(3)	(4)	(5)
Late Campaign	0.0483	0.0482	0.0565	0.0565	0.0565
Randomization Inference p-value	0.002	0.002	0.000	0.000	0.000
Observations	16,080	16,080	16,080	16,080	16,080
R-squared	0.0402	0.0858	0.1123	0.1578	0.1941
Day FE		Yes		Yes	
Continent FE			Yes	Yes	
Continent FE * Day FE					Yes
	B. Late campaign relative to first COVID-19 death in country				
	(1)	(2)	(3)	(4)	(5)
Late Campaign	0.0402	0.0402	0.0460	0.0460	0.0460
Randomization Inference p-value	0.042	0.042	0.020	0.020	0.020
Observations	15,500	15,500	15,500	15,500	15,500
R-squared	0.0212	0.0685	0.0819	0.1291	0.1642
Day FE		Yes		Yes	
Continent FE			Yes	Yes	
Continent FE * Day FE					Yes

Note. All specifications include a constant term.

Table 2. Sensitivity to the inclusion of covariates. Dependent variable = Google search queries for the QAnon topic. *Late Campaign* is the number of days between the start of government COVID-19 communication campaigns and the first COVID-19 case (Panel A) or death (Panel B) in the country.

A. Late campaign relative to first COVID-19 case in country							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Late Campaign	0.0435	0.0412	0.0479	0.0468	0.0830	0.0535	0.0425
p-value	0.020	0.004	0.000	0.000	0.004	0.000	0.000
Covariates included:	ICRG	GDP	Democracy	Human capital	Schwartz Values	COVID-19 restrictions	COVID-19 cases
Observations	14,340	15,065	14,775	13,905	8,830	16,031	14,920
R-squared	0.3396	0.2385	0.1954	0.2428	0.3582	0.211	0.2279
Continent * Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Late campaign relative to first COVID-19 death in country							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Late Campaign	0.0426	0.0458	0.0557	0.0517	0.0763	0.0454	0.0497
p-value	0.042	0.022	0.024	0.018	0.004	0.022	0.032
Covariates included:	ICRG	GDP	Democracy	Human capital	Schwartz Values	COVID-19 restrictions	COVID-19 cases
Observations	14,775	15,645	15,355	14,485	9,120	15,451	15,500
R-squared	0.3424	0.2493	0.2216	0.2581	0.3629	0.2271	0.2459
Continent * Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Model dependence. We consider whether our results are model-dependent by examining whether the patterns we document above are driven by idiosyncratic combinations of observations and control variables. Our starting point is the most demanding specification from Table 1 (Model 5), which includes day-by-continent fixed effects. For each variant of Late Campaign (defined relative to the earliest COVID-19 case or death), we run 500 iterations of our regression equation including either

(i) all control variables, and a randomly selected 50% of all observations, or (ii) all observations, and a randomly selected 50% of all control variables. We collect the resulting 2,000 test statistics for Late Campaign and plot them against their percentile rank in Figure 2. Overall, 92% of the t-statistics are above the rule of thumb critical value of 1.96 (shown by the dashed horizontal line), indicating that our results are not model-dependent.

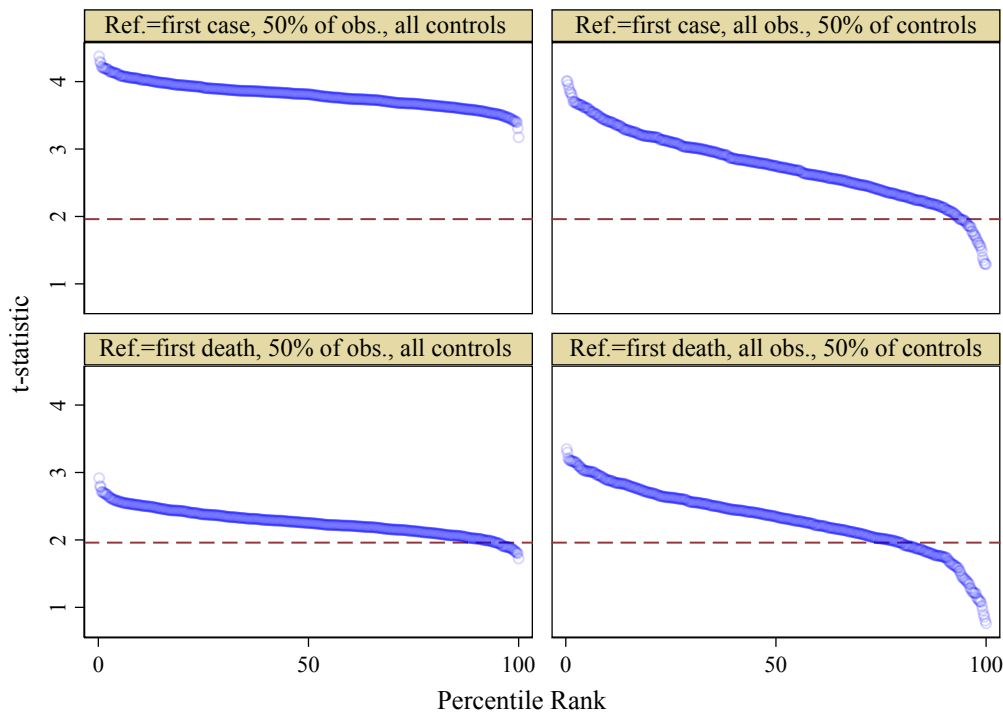


Figure 2. Model dependence: 2,000 test statistics and percentile ranks.

Study 2

Introduction

In Study 1, we establish a correlation between government communication lateness and Google searches for QAnon. Our estimates suggest that a one standard deviation increase in lateness is correlated with an approximately 50% increase in searches for QAnon. These results hold up to extensive scrutiny, as evidenced by Table 2 and Figure 2. However, we cannot rule out that the observed pattern reflects pre-existing differences between countries. If late-communication countries had higher levels of QAnon searches prior to the pandemic, then it is possible that Study 1 is over-stating the importance of early communication.

Methods

We estimate variants of Equation (2):

$$QAnon_{it} = \beta_0 + \beta_1 Post_{it} + \beta_2 LC_i + \beta_3 (Post_{it} * LC_i) + \mathbf{X}_{it}\rho + \mu_{it} \quad (2)$$

where *LC* is shorthand notation for *Late Campaign*, and *Post* is a dummy variable set equal to 1 from date *t*, for a given country, if either (i) government officials have started communicating about COVID-19, or (ii) the country has reported its first case of COVID-19. *Post* is thus equal to 1 from the day the virus is brought to the public's attention, either via government communication or via the first local case. As such, *Post* accounts for differences in searches for QAnon across the pre- and during-pandemic periods, which allows us to rule out that any effect we see in Study 1 is driven by increased interest in QAnon due to the pandemic more generally, rather than to government communication timeliness. The coefficient of interest in Equation (2) is the coefficient of *Post * LC*, β_3 , which captures differences in QAnon searches associated with communication timeliness in the post period, above and beyond: (i) secular trends captured by *Post*, and crucially, (ii) pre-existing cross-country differences in QAnon searches that are associated with unobserved correlates of *Late Campaign*.

In Equation (2), the coefficient of *LC* is interpreted as the pre-pandemic correlation between QAnon searches and government communication. If countries with late government communication had higher QAnon searches to begin with, in the pre-pandemic period, then *LC* will account for those differences. The coefficient of *Post * LC* therefore informs us about the correlation between government communication and QAnon searches net of pre-existing differences and secular trends.

Results

SI Tables S4 and S5 present the results of estimating Equation (2) with the same sets of covariates as those included in Tables 1 and 2 respectively. The coefficient of *Post * LC* is large and significant throughout, indicating that our previous results were not driven by pre-existing differences in interest in QAnon or by increased interest in QAnon once the virus becomes known to the public. Interestingly, both of these factors turn out to be positive and significant, and thus important to control for: interest in QAnon does rise once the virus becomes known to the public, as evidenced by the coefficient estimates for *Post*, and there are some small but generally significant pre-existing differences in interest in QAnon, as evidenced by the estimates for *Late Campaign*.

For ease of comparison, Figure 3 plots the coefficients of *Late Campaign* from Study 1 and those of *Post * Late Campaign* from Study 2 by model. The two sets of coefficients are similar, averaging 0.054 and 0.050 respectively. Since we now have a well-defined treatment period, we can refine our interpretation of the effect: in Study 1, we found that the coefficients of *Late Campaign* constituted an increase in searches for QAnon in the order of 2 to 2.76 percentage points, evaluated against the all-time mean QAnon search volume, which is equal to 2.05. Since the coefficient of *Post * Late Campaign* is specific to the post period, we can interpret it relative to the mean dependent variable in the pre-pandemic period, which is 0.76. The average coefficient of *Post * Late Campaign* we document in Study 2 is 0.050, which means that a one-day increase in government communication lateness translates to a $(0.050 / 0.76) * 100 = 6.55$ percentage points increase in QAnon searches, relative to the pre-pandemic period. A one standard deviation increase in communication lateness (26.2 days) translates to a 172% increase in QAnon searches relative to the pre-pandemic period.

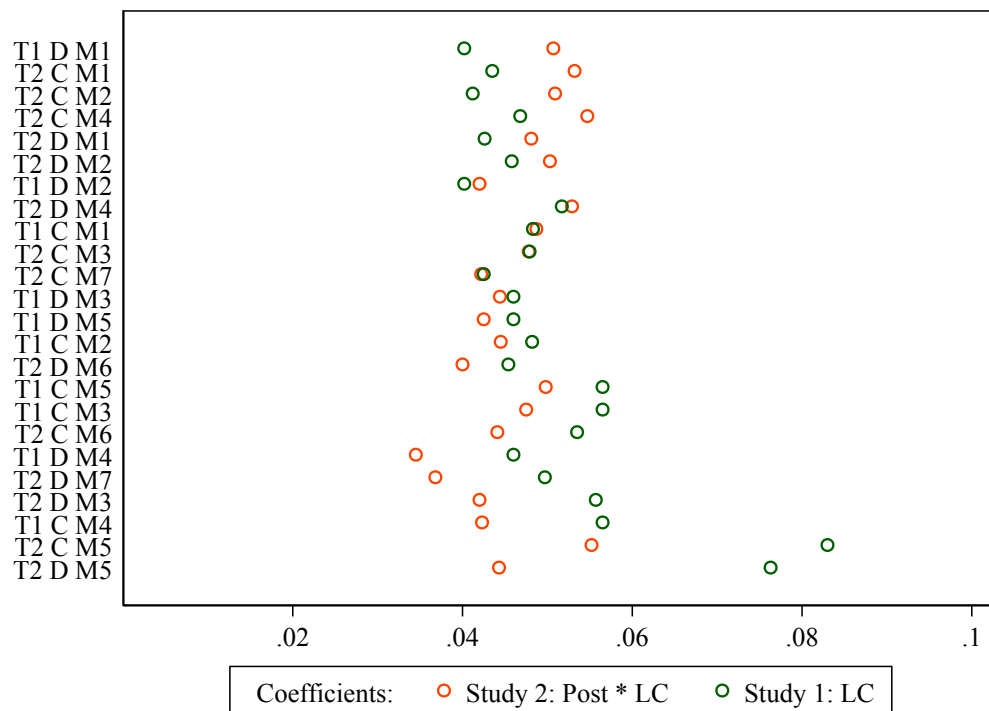


Figure 3. Dot chart of coefficients from Studies 1 and 2. T=Table, M=Model, C/D denote Late Campaign relative to first case or first death.

Study 3

Background

Do the results presented in Studies 1 and 2 apply exclusively to the QAnon conspiracy theory, or do they extend to conspiratorial beliefs about COVID-19 more generally? To answer this question, we use data from the International Collaboration on the Social and Moral Psychology (ICSMP) of COVID-19 study (Van Bavel et al. 2020b). We pre-registered our analysis on the Open Science Framework at <https://osf.io/kqnvq>, which was necessary in order to obtain the data.

Materials and Methods

The ICSMP study surveyed 44,000 respondents from 67 countries on their attitudes and behavioural intentions related to the COVID-19 pandemic. The study is a large-scale collaboration involving research teams around the world; further details on the project, including a complete codebook, are available at <https://icsmp-covid19.netlify.app/about.html>. The list of countries included in Study 3, along with the number of respondents per country, can be found in SI Table S6. We follow our pre-analysis plan with one slight departure. In our pre-registration, we indicated that we would drop from the dataset those respondents who gave the same number answer on two specified pairs of questions from the moral identity block of the survey, thus indicating that the respondent was not reading the question before answering. We did not foresee that respondents could hold genuinely middle-of-the-road opinions, leading them to answer the pair of questions with 5 out of 10. This pattern is borne out in the data (SI Figures S3-S4 and accompanying explanation); we therefore keep those respondents who responded with 5 out of 10 on our flat-line detection questions, but exclude others as per our pre-registration.

Keeping in line with our pre-registration, we consider two dependent variables from the ICSMP, which we refer to as the “Authoritarian” and “Financial” conspiracy types in Table 3 below. *Authoritarian* is the degree of agreement, from 0 to 10, with the statement: “The coronavirus (COVID-19) is a conspiracy to take away citizen’s rights for good and establish an authoritarian government”. *Financial* is the degree of agreement with the statement “The coronavirus (COVID-19) is a hoax invented by interest groups for financial gains.”

Results

Table 3 presents the main results of Study 3. Across the board, there is no correlation between either type of conspiratorial belief (Authoritarian or Financial) and government communication timeliness. The smallest p-value in Table 3 is in Panel A Model 2, and does not indicate significance

$p = 0.058$), while the largest p -value is 0.568. While the estimates are not statistically different from zero, it is worth noticing that they are negative, which is the opposite of what we hypothesized and of what we found in Studies 1 and 2. We investigate this result in the following sub-section.

Table 3. Main results from Study 3. *Late Campaign* is the number of days between the start of government COVID-19 communication campaigns and the first COVID-19 case (Panel A) or death (Panel B) in the country.

		A. Late campaign relative to first COVID-19 case in country							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conspiracy	type:	Authoritarian	Financial	Authoritarian	Financial	Authoritarian	Financial	Authoritarian	Financial
		Late Campaign	-0.0108	-0.0134	-0.0099	-0.0119	-0.0108	-0.0134	-0.0103
RI p-value	0.132	0.058	0.152	0.070	0.146	0.060	0.170	0.080	
Observations		40,235	40,233	38,585	38,584	38,764	38,761	37,167	37,165
R-squared		0.0070	0.0113	0.0258	0.0331	0.0291	0.0323	0.0431	0.0494
Demographics				Yes	Yes			Yes	Yes
Continent FE						Yes	Yes	Yes	Yes

		B. Late campaign relative to first COVID-19 death in country							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conspiracy	type:	Authoritarian	Financial	Authoritarian	Financial	Authoritarian	Financial	Authoritarian	Financial
		Late Campaign	-0.0070	-0.0077	-0.0065	-0.0068	-0.0046	-0.0068	-0.0047
RI p-value	0.408	0.336	0.416	0.398	0.586	0.416	0.568	0.428	
Observations		40,235	40,233	38,585	38,584	38,764	38,761	37,167	37,165
R-squared		0.0026	0.0033	0.0221	0.0266	0.0230	0.0230	0.0377	0.0418
Demographics				Yes	Yes			Yes	Yes
Continent FE						Yes	Yes	Yes	Yes

Notes. RI = randomization inference. FE = fixed effects. Demographic controls: age (continuous), gender (categorical), has children (binary), employment status (categorical). All specifications include a constant term.

Model dependence

We are interested in determining whether the negative signs of the coefficients in Table 3 denote a true negative effect that is measured noisily, or instead denote a true zero effect that appears to

be negative only in some models. To this end, we perform a similar model-dependence analysis for Study 3 as we did for Study 1, again examining whether the results are driven by idiosyncratic combinations of observations and control variables. For each of the two types of conspiracy beliefs (Authoritarian and Financial) and for each variant of Late Campaign (defined relative to the earliest COVID-19 case or death), we run 500 iterations of our regression equation including either (i) all control variables, and a randomly selected 50% of all observations, or (ii) all observations, and a randomly selected 50% of all control variables. The 4,000 resulting t-statistics are displayed in Figure 4: the mean t-statistic is almost exactly zero ($\bar{t} = 0.16$), and only 4.975% of t-statistics are greater, in absolute value, than 1.96. We thus conclude that Study 3 uncovers a null relationship between government communication timeliness and conspiratorial beliefs other than QAnon.

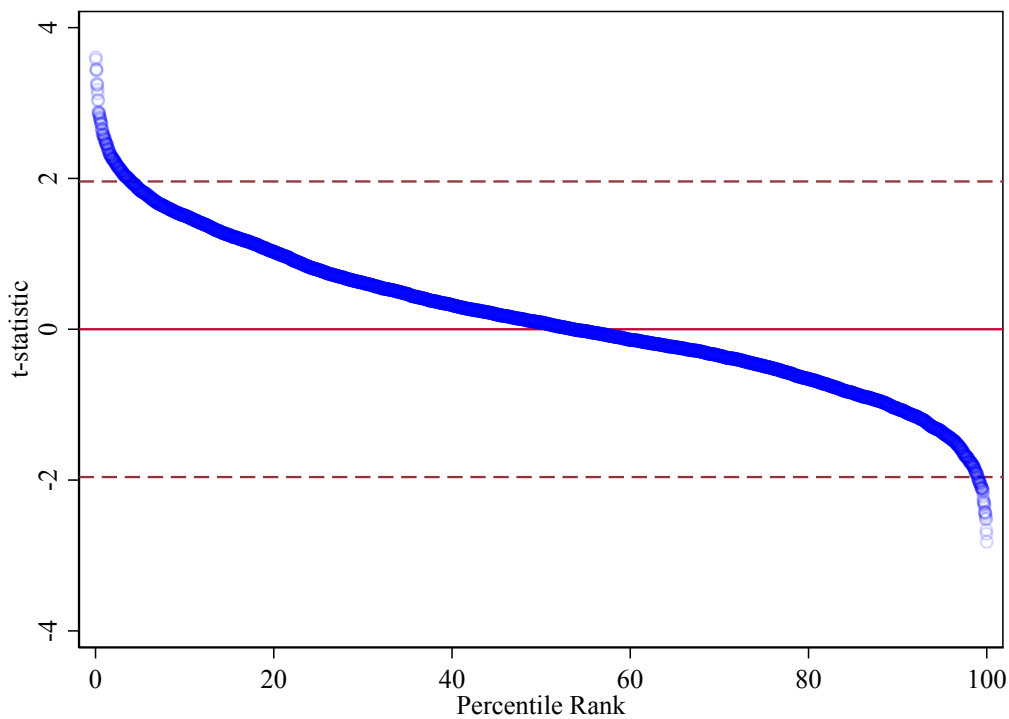


Figure 4. Model dependence: 4,000 test statistics and percentile ranks.

Study 4

Background

So far, we have found that government communication timeliness is correlated with search interest for QAnon (Studies 1 and 2) but not in stated beliefs in other COVID-19-related conspiracy theories (Study 3). In Study 4, we ask whether these differing results can be partly explained by

social desirability bias. The rationale is as follows: stated attitudes on surveys may suffer from desirability bias, whereas Google searches likely do not. Indeed, one of the main motivations for using Google search data is that they reveal what people are searching for within the privacy of their own phones, computers or tablets, without the need to conceal their thoughts from anyone. We conjecture that in surveys, even anonymous ones like the ICSMP, conspiracy-oriented individuals may not readily report their true opinions about loaded questions such as beliefs in pandemic-related conspiracies. If our conjecture is correct, then taking desirability bias into account empirically should increase the coefficient of *Late Campaign* in Study 3, but leave it unaffected in Study 1.

Methods

Ideally, we would like to control for a direct individual-level or country-level variable capturing one's inclination to acquiesce to desirability bias. Unfortunately, the literature offers no guidance on how to construct such a variable. The literature does, however, take note of the fact that social desirability bias is a cultural trait (Bernardi 2006, Kim and Kim 2016, Dunn and Shome 2009, Ryan et al. 2020). Thus, in the absence of a more direct measure, we endeavour to control for desirability bias by including Schwartz's (2006) seven cultural value orientations. To the extent that Schwartz's values account for differences in national culture, and to the extent that desirability bias is a cultural phenomenon, Schwartz's values should pick up the effect of social desirability bias, if it is present, in our previous estimates.

Our analysis consists in replicating the main table for each of Studies 1 and 3 (Tables 1 and 3 respectively), while controlling for Schwartz's values and while holding the sample constant. For example, we first estimate the coefficient of *Late Campaign* using Model 1 from Table 1, without Schwartz controls, and only for those observations where Schwartz controls are non-missing. Second, we estimate the same coefficient using the same model, but this time also controlling for Schwartz values. We then calculate the percentage change in the coefficient of *Late Campaign* when Schwartz values are controlled for, relative to when they are not. We perform this analysis both for Google searches and for ICSMP survey responses.

Results

Figure 5 displays the results of the analysis. The green box-and-whisker represents the distribution of coefficient changes when survey responses are used as dependent variables, while the orange box-and-whisker maps the distribution of coefficient changes for Google searches as the dependent variable. The horizontal line through the solid box is the mean change, the top and

bottom of the solid box are the upper and lower bounds of the 95% CI, and the top and bottom of each capped spike are the maximum and minimum changes.

Figure 5 supports the notion that social desirability bias plays a role in explaining the insignificant result of Study 3. In the green box-and-whisker, it can be seen that the coefficients of Late Campaign from Table 3 grow larger by 38 – 144%, with an average increase of 83.5% (95% CI: 65.7 to 101.2%). In contrast, the orange box-and-whisker shows that the coefficients of *Late Campaign* from Table 1, using Google searches as the dependent variable, are unaffected: the mean change is just 6.1% (95% CI: - 5 to +17.5%), which is not statistically different from 0, thus corroborating the idea that Google searches do not suffer from social desirability bias.

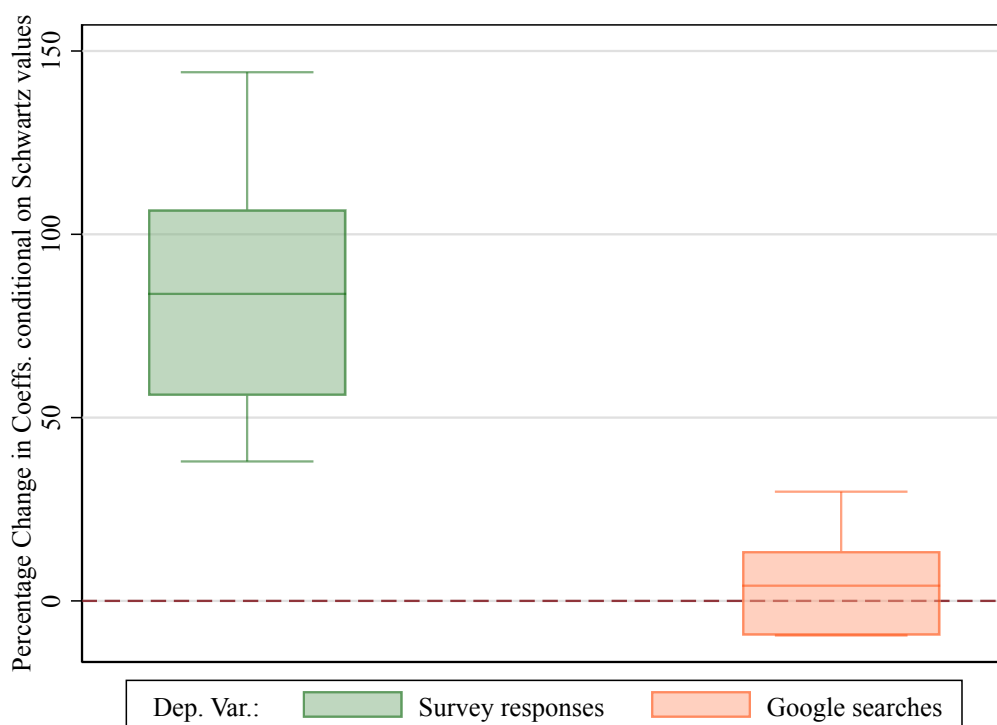


Figure 5. Percentage change in coefficients when Schwartz values are controlled for.

Limitations

While Google searches (Studies 1 and 2) present the clear advantages of being measured in near real-time, available across a wide range of geographies, and not subject to desirability biases (as we confirm in Study 4), a noteworthy limitation of Google data is that they do not necessarily reflect being “taken in” by the QAnon conspiracy theory. We do however have evidence from previous work (Stephens-Davidowitz 2014, Madestam et al. 2013) and from SI Figure S5 that Google

searches correlate with actual political behaviour, such that our results are unlikely to reflect mere fleeting curiosity.

Another limitation of this paper is that we do not study other elements of government risk communication besides timeliness. One would expect that other facets of risk communication, including accuracy and consistency, also matter for the formation of alternative narratives: there are anecdotal reports, for example, of the public feeling misled by early calls for not using face masks (which were ostensibly directed at preventing mask hoarding) which were later reversed to recommended or even compulsory mask policies.⁷ We believe this is a fruitful area for future data collection efforts, as we know of no dataset that takes stock of other facets of government risk communication beyond timeliness. Another potentially productive research agenda, going forward, would be to explore the dynamics of conspiratorial beliefs and government communication as contextual elements change. We leave these questions open for future research.

Conclusion

In this paper, we have examined the link between the timeliness of government communication and the rise of COVID-19 related conspiracy theories. In Study 1, we showed that the earlier governments communicate about the virus, relative to the first instances of the virus in a given country, the smaller the public's interest was in the very destructive QAnon conspiracy theory, as measured by Google searches for QAnon, in a sample of 111 countries and territories. In Study 2, we showed that the Study 1 results cannot be explained away by either of two crucial factors: (i) rising interest in QAnon in the COVID-19 era, and (ii) pre-pandemic cross-country differences in interest in QAnon. Instead, interest in QAnon appears to rise specifically in response to late government communication about the virus. Our estimates suggest that, when evaluated against pre-pandemic levels of interest in QAnon, a one standard deviation increase in communication lateness is associated with a near-tripling (172 percentage point increase) interest in QAnon. This result should serve as a caution for policymakers in future developments with the COVID-19 pandemic and other crises as they may arise: late risk communication fosters the rise of extreme beliefs. We believe this is an important result, especially in a world where misinformation is rife.

In the pre-registered Study 3, we found no significant relationship between government communication timeliness and self-reported beliefs in other conspiracies around the COVID-19 pandemic. Specifically, respondents in countries with later government communication did not report greater beliefs that COVID-19 was either a conspiracy to establish an authoritarian

⁷ Financial Times, [“French public feels lied to as lockdown fatigue grows”](#)

government or a hoax perpetrated by financial groups for financial gains. While we show that this result may be partially explained by social desirability bias (Study 4), we believe it is also reassuring to observe that not all conspiratorial ideas respond equally largely to government (in)action.

References

- Abadie, A., Athey, S., Imbens, G. W., & Wooldridge, J. (2017). When should you adjust standard errors for clustering? (No. w24003). National Bureau of Economic Research.
- Arpan, L. M., & Roskos-Ewoldsen, D. R. (2005). Stealing thunder: Analysis of the effects of proactive disclosure of crisis information. *Public Relations Review*, 31(3), 425-433.
- Ashton, J. (2020). COVID-19 and the 'Spanish'flu. *Journal of the Royal Society of Medicine*, 113(5), 197-198.
- Barry, J. M. (2004). *The great influenza: The story of the deadliest pandemic in history*. Penguin Group.
- Bernardi, R. A. (2006). Associations between Hofstede's cultural constructs and social desirability response bias. *Journal of Business Ethics*, 65(1), 43-53.
- Chan, H.F., Rizio, S.M., Skali, A., & Torgler, B. (2021). Social Distancing Restrictions and Interest in the QAnon Conspiracy Theory. Mimeo.
- Coombs, W. T. & Holladay, S. J. (Eds.) (2010). *The Handbook of Crisis Communication*. Blackwell Publishing.
- Covello, V. T. (2003). Best practices in public health risk and crisis communication. *Journal of Health Communication*, 8(S1), 5-8.
- Dolnik, L., Case, T. I., & Williams, K. D. (2003). Stealing thunder as a courtroom tactic revisited: Processes and boundaries. *Law and Human Behavior*, 27(3), 267-287.
- Douglas, K. M., Sutton, R. M., & Cichocka, A. (2017). The psychology of conspiracy theories. *Current Directions in Psychological Science*, 26(6), 538-542.
- Dunn, P., & Shome, A. (2009). Cultural crossvergence and social desirability bias: Ethical evaluations by Chinese and Canadian business students. *Journal of Business Ethics*, 85(4), 527-543.
- Feenstra, R. C., Inklaar, R., & Timmer, M. P. (2015). The next generation of the Penn World Table. *American Economic Review*, 105(10), 3150-82.
- Fisher, R. A. (1935). *The design of experiments*. Oliver & Boyd.
- Hale, T., Webster, S., Petherick, A., Phillips, T., & Kira, B. (2020). Oxford COVID-19 Government Response Tracker, Blavatnik School of Government. Data use policy: Creative Commons Attribution CC BY standard.
- Heath, R. L. & O'Hair, H. D. (Eds.) (2009). *Handbook of Risk and Crisis Communication*. Routledge.

- Kim, S. H., & Kim, S. (2016). National Culture and Social Desirability Bias in Measuring Public Service Motivation. *Administration & Society*, 48(4), 444–476.
- Lee, J. D. (2014). *An epidemic of rumors: How stories shape our perception of disease*. University Press of Colorado.
- Lewandowsky, S., & Cook, J. (2020). *The Conspiracy Theory Handbook*. Available at <http://sks.to/conspiracy>
- Malecki, K. M., Keating, J. A., & Safdar, N. (2021). Crisis communication and public perception of COVID-19 risk in the era of social media. *Clinical Infectious Diseases*, 72(4), 697-702.
- Madestam, A., Shoag, D., Veuger, S., & Yanagizawa-Drott, D. (2013). Do Political Protests Matter? Evidence from the Tea Party Movement. *The Quarterly Journal of Economics*, 128(4), 1633-1686.
- Marshall, M. G., Gurr, T. R., & Jaggers, K. (2013). Polity IV project: Political regime characteristics and transitions, 1800–2012. *Center for Systemic Peace*.
- O'Connor, C., & Weatherall, J. O. (2019). *The misinformation age: How false beliefs spread*. Yale University Press.
- PRS (2018). International Country Risk Guide: Guide to Data Variables. Available at: <https://epub.prsgroup.com/list-of-all-variable-definitions>.
- Retief, F. P., & Cilliers, L. (2000). Epidemics of the Roman Empire, 27 BC-AD 476. *South African Medical Journal*, 90(3), 267-272.
- Rosenblum, N. L., & Muirhead, R. (2020). *A lot of people are saying: The new conspiracism and the assault on democracy*. Princeton University Press.
- Ryan, A. M., Bradburn, J., Bhatia, S., Beals, E., Boyce, A. S., Martin, N., & Conway, J. (2020). In the eye of the beholder: Considering culture in assessing the social desirability of personality. *Journal of Applied Psychology*. Advance online publication.
- Schwartz, S. (2006). A theory of cultural value orientations: Explication and applications. *Comparative Sociology*, 5(2-3), 137-182.
- Snowden, F. M. (2019). *Epidemics and society: from the Black Death to the present*. Yale University Press.
- Stephens-Davidowitz, S. (2014). The cost of racial animus on a black candidate: Evidence using Google search data. *Journal of Public Economics*, 118, 26-40.
- Sternisko, A., Cichocka, A., & Van Bavel, J. J. (2020). The dark side of social movements: Social identity, non-conformity, and the lure of conspiracy theories. *Current Opinion in Psychology*, 35, 1-6.
- Van Bavel, J. J., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., ... & Willer, R. (2020a). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour*, 4(5), 460-471.
- Van Bavel, J.J., Cichocka, A., Capraro, V., Sjästad, H., Nezlek, J.B., Pavlović T., Alfano A., Gelfand, M.J., Azevedo, F., Birtel M.D., Cislak, A., Lockwood, P., Ross, R. M., Stoyanova, K.K.,

Abts, K., Amodio, D.M., Apps, M. A.J., Aruta, J.J.B.R., Besharati, S., ..., Boggio, P. (2020b). National identity predicts public health support during a global pandemic. Manuscript submitted for publication.

van der Linden, S., Panagopoulos, C., Azevedo, F., & Jost, J. T. (2021). The paranoid style in American politics revisited: an ideological asymmetry in conspiratorial thinking. *Political Psychology*, 42(1), 23-51.

Williams, D. E., & Treadaway, G. (1992). Exxon and the Valdez accident: A failure in crisis communication. *Communication Studies*, 43(1), 56-64.

SUPPLEMENTARY INFORMATION

For online publication only

Table S1. Summary statistics.

Variable	N	Mean	SD	Min	Max
Main variables					
QAnon	16080	2.05	6.31	0	100
COVID-19 is a conspiracy to establish authoritarian gov.	40861	2.74	3.13	0	10
COVID-19 is a hoax for financial gain	40858	2.45	3.07	0	10
Late Campaign (ref.=cases)	16080	-10.52	26.23	-59	59
Late Campaign (ref.=deaths)	15500	-31.11	23.22	-79	20
Study 2 controls					
<i>Employment</i>					
Full time	39883	0.44	0.50	0	1
Part time	39883	0.11	0.31	0	1
Unemployed	39883	0.09	0.28	0	1
Student	39883	0.12	0.32	0	1
Retired	39883	0.14	0.35	0	1
Other	39883	0.11	0.31	0	1
Has children	40662	0.54	0.50	0	1
<i>Marital status</i>					
Single	40773	0.34	0.47	0	1
In a relationship	40773	0.20	0.40	0	1
Married	40773	0.46	0.50	0	1
Age	40908	43.11	16.06	18	100
<i>Sex</i>					
Male	40980	0.47	0.50	0	1
Female	40980	0.53	0.50	0	1
Other	40980	0.00	0.05	0	1

Table S1. Summary statistics, continued.

Variable	N	Mean	SD	Min	Max
Government Restrictions					
<i>School Closures</i>					
No measures	16033	0.49	0.50	0	1
Recommended closures	16033	0.01	0.09	0	1
Require closing (some)	16033	0.04	0.21	0	1
Require closing (all)	16033	0.46	0.50	0	1
<i>Workplace closing</i>					
No measures	16033	0.53	0.50	0	1
Recommend closing	16033	0.05	0.22	0	1
Require closing (some)	16033	0.20	0.40	0	1
Require closing (all)	16033	0.22	0.41	0	1
<i>Cancel public events</i>					
No measures	16033	0.48	0.50	0	1
Recommend cancelling	16033	0.03	0.18	0	1
Require cancelling	16033	0.49	0.50	0	1
<i>Restrictions on gatherings</i>					
No restrictions	16033	0.54	0.50	0	1
Restrictions on gatherings above 1000 people	16033	0.02	0.13	0	1
Restrictions on gatherings between 101-1000 people	16033	0.03	0.16	0	1
Restrictions on gatherings between 11-100 people	16033	0.12	0.32	0	1
Restrictions on gatherings of 10 people or less	16033	0.30	0.46	0	1
<i>Close public transport</i>					
No measures	16032	0.66	0.47	0	1
Recommend closing	16032	0.16	0.37	0	1
Require closing	16032	0.18	0.38	0	1
<i>Stay at home requirements</i>					
No measures	16033	0.57	0.49	0	1
Recommend not leaving house	16033	0.13	0.33	0	1
Require not leaving (loose)	16033	0.23	0.42	0	1
Require not leaving (strict)	16033	0.07	0.26	0	1

Table S1. Summary statistics, continued.

Variable	N	Mean	SD	Min	Max
<i>Restrictions on internal movement</i>					
No measures	16032	0.58	0.49	0	1
Recommend movement restriction	16032	0.09	0.29	0	1
Restrict movement	16032	0.33	0.47	0	1
<i>International travel controls</i>					
No measures	16033	0.36	0.48	0	1
Screening	16033	0.07	0.25	0	1
Quarantine on high-risk regions	16033	0.06	0.23	0	1
Ban on high-risk regions	16033	0.22	0.41	0	1
Total border closure	16033	0.30	0.46	0	1
International Country Risk Guide variables					
Bureaucracy quality	14775	2.60	0.92	1	4
Civil disorder	14775	2.81	0.40	2	4
Civil war	14775	3.69	0.50	3	4
Consumer confidence	14775	2.07	0.19	2	3
Contract viability	14775	3.10	0.56	2	4
Corruption	14775	3.03	1.16	1	6
Cross-border conflict	14775	3.12	0.60	2	4
Economic risk rating	14775	36.36	5.68	16	47
Ethnic tensions	14775	4.06	1.15	1	6
Foreign pressures	14775	2.94	0.39	2	4
Government stability	14775	7.08	0.94	4	10
Military in politics	14775	4.18	1.49	1	6
Payment delays	14775	2.75	0.64	2	4
Religious tensions	14775	4.57	1.29	1	6
Schwartz values					
Harmony	9120	-0.01	0.99	-3	2
Embeddedness	9120	-0.14	0.92	-2	2
Hierarchy	9120	-0.01	0.99	-2	3
Mastery	9120	0.10	0.93	-2	3
Affective autonomy	9120	0.15	0.91	-3	2
Intellectual autonomy	9120	0.10	0.95	-2	2
Egalitarianism	9120	0.03	1.03	-2	2

Table S1. Summary statistics, continued.

Variable	N	Mean	SD	Min	Max
Other controls					
ln(Gross Domestic Product per capita)	15645	9.74	0.90	7	12
Democracy	15355	5.14	6.20	-10	10
Human Capital Index	14485	2.91	0.54	2	4
ln(COVID-19 cases per capita)	15500	2.46	2.80	0	10

Table S2. Variable definitions and sources.

Variable	Definition	Source
Main variables		
QAnon	Google search volumes for the QAnon topic. Measured at the country level. Daily frequency between January 1 and May 24, 2020	Google Trends
COVID-19 is a conspiracy to establish authoritarian gov.	Agreement with the statement: "The coronavirus (COVID-19) is a conspiracy to take away citizen's rights for good and establish an authoritarian government." Scale: 0 - 10; higher values indicate more agreement.	Van Bavel et al. (2020)
COVID-19 is a hoax for financial gain	The coronavirus (COVID-19) is a hoax invented by interest groups for financial gains." Scale: 0 - 10; higher values indicate more agreement.	Van Bavel et al. (2020)
Late Campaign (ref.=cases)	Number of days between the first case of COVID-19 in a country and the first instance of government communication about COVID-19 with the public.	Calculated from Hale et al. (2020)
Late Campaign (ref.=deaths)	Number of days between the first death of COVID-19 in a country and the first instance of government communication about COVID-19 with the public.	Calculated from Hale et al. (2020)
Study 2 controls		
Employment	See Table S1	Van Bavel et al. (2020)
Has children	Yes / No	Van Bavel et al. (2020)
Marital status	See Table S1	Van Bavel et al. (2020)
Age		Van Bavel et al. (2020)
Sex	See Table S1	Van Bavel et al. (2020)
Government Restrictions	The OxCGRT dataset collects data on eight types of restrictions: (1) school closures, (2) workplace closures, (3) cancel public events, (4) restrictions on gathering, (5) public transport closures, (6) stay at home requirements, (7) restrictions on internal movement, (8) international travel restrictions. Each restriction is a categorical variable with varying levels of strictness, as shown in Table S1. We use dummy variables for each level of each restriction.	Hale et al. (2020)

Table S2. Variable definitions and sources, continued.

Variable	Definition	Source
International Country Risk Guide variables	Expert ratings as detailed below. Definitions from the PRS Group website: https://epub.prsgroup.com/list-of-all-variable-definitions	
Bureaucracy quality	Institutional strength and quality of the bureaucracy is a shock absorber that tends to minimize revisions of policy when governments change. In low-risk countries, the bureaucracy is somewhat autonomous from political pressure.	PRS (2018)
Civil disorder	The potential risk to governance or investment from mass protest, such as anti-government demonstrations, strikes, etc	PRS (2018)
Civil war	The actual or potential risk of civil war (where a rebel force, which holds territory, is in armed conflict with the security forces of the government, and where both forces are citizens of the state in which the conflict occurs).	PRS (2018)
Consumer confidence	The level of consumer confidence vis-à-vis credible surveys, where available, or approximations based on employment trends, economic growth and investment, etc	PRS (2018)
Contract viability	The risk of unilateral contract modification or cancellation and, at worst, outright expropriation of foreign owned assets.	PRS (2018)
Corruption	A measure of corruption within the political system that is a threat to foreign investment by distorting the economic and financial environment, reducing the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability, and introducing inherent instability into the political process.	PRS (2018)
Cross-border conflict	Actual or potential conflict with another nation state that does not affect the whole nation and which can range in severity from cross-border armed conflict and incursion to territorial claims subject to civil mediation or litigation.	PRS (2018)

Table S2. Variable definitions and sources, continued.

Variable	Definition	Source
Economic risk rating	A means of assessing a country's current economic strengths and weaknesses. In general, where strengths outweigh weaknesses, a country will show low risk and where weaknesses outweigh strengths, the economic risk will be high. To ensure comparability between countries, risk components are based on accepted ratios between the measured data within the national economic/financial structure, and then the ratios are compared, not the data. Risk points are assessed for each of the component factors of GDP per head of population, real annual GDP growth, annual inflation rate, budget balance as a percentage of GDP, and current account balance as a percentage of GDP. Risk ratings range from a high of 50 (least risk) to a low of 0 (highest risk), though lowest de facto ratings are generally near 15.	PRS (2018)
Ethnic tensions	A measure of the degree of tension attributable to racial, national, or language divisions. Lower ratings (higher risk) are given to countries where tensions are high because opposing groups are intolerant and unwilling to compromise.	PRS (2018)
Foreign pressures	Actual or potential risk posed by pressures brought to bear on the government by one or more foreign states to force a change of policy. Such pressures can range from diplomatic pressures, through suspension of aid and/or credits, to outright sanctions.	PRS (2018)
Government stability	A measure of both of the government's ability to carry out its declared program(s), and its ability to stay in office.	PRS (2018)
Military in politics	A measure of the military's involvement in politics. Since the military is not elected, involvement, even at a peripheral level, diminishes democratic accountability. Military involvement might stem from an external or internal threat, be symptomatic of underlying difficulties, or be a full-scale military takeover. Over the long term, a system of military government will almost certainly diminish effective governmental functioning, become corrupt, and create an uneasy environment for foreign businesses.	PRS (2018)
Payment delays	The risk associated with receiving and exporting payments from the country (impediments include poor liquidity, exchange controls, an inadequate banking system, etc.)	PRS (2018)
Religious tensions	A measure of religious tensions arising from the domination of society and/or governance by a single religious group -- or a desire to dominate -- in a way that replaces civil law by religious law, excludes other religions from the political/social processes, suppresses religious freedom or expressions of religious identity. The risks involved range from inexperienced people imposing inappropriate policies to civil dissent or civil war.	PRS (2018)

Table S2. Variable definitions and sources, continued.

Variable	Definition	Source
Schwartz cultural value orientations		
Harmony	Individuals are content to accept and fit into the natural and social world	Schwartz (2006)
Embeddedness	People are viewed as entities embedded in the collective.	Schwartz (2006)
Hierarchy	Individuals are socialized to comply with the roles assigned to them in the social hierarchy	Schwartz (2006)
Mastery	Individuals value succeeding and getting ahead through self-assertion	Schwartz (2006)
Affective Autonomy	Individuals pursue affectively positive experience for themselves	Schwartz (2006)
Intellectual Autonomy	Individuals pursue their own ideas and intellectual directions independently.	Schwartz (2006)
Egalitarianism	Individuals are seen as moral equals	Schwartz (2006)
Other controls		
ln(Gross Domestic Product per capita)	Measured in real (inflation-adjusted) terms.	Bolt and van Zanden (2014)
Democracy	Level of democracy ranging from -10 (full autocracy) to +10 (full democracy).	Marshall, Gurr and Jagers (2013)
Human Capital Index	An index based on the average years of schooling and an assumed rate of return to equation. For exact formulae and primary data sources, see https://www.rug.nl/ggdc/docs/human_capital_in_pwt_90.pdf	Feenstra, Inklaar and Timmer (2015)
ln(COVID-19 cases per capita)	Daily frequency	Hale et al. (2020)

Table S3. List of countries and territories included in Study 1.

Afghanistan	Hong Kong	Qatar
Albania	Hungary	Romania
Algeria	Iceland	Russia
Argentina	India	Saudi Arabia
Australia	Indonesia	Serbia
Austria	Iran	Singapore
Azerbaijan	Iraq	Slovakia
Bahrain	Ireland	Slovenia
Bangladesh	Israel	South Africa
Barbados	Italy	South Korea
Belarus	Jamaica	Spain
Belgium	Japan	Sri Lanka
Bolivia	Jordan	Sweden
Bosnia and Herzegovina	Kazakhstan	Switzerland
Brazil	Kenya	Taiwan
Bulgaria	Kuwait	Tanzania
Cambodia	Latvia	Thailand
Canada	Lebanon	Trinidad and Tobago
Chile	Lithuania	Tunisia
China	Luxembourg	Turkey
Colombia	Malaysia	Uganda
Costa Rica	Mauritius	Ukraine
Croatia	Mexico	United Arab Emirates
Cyprus	Moldova	United Kingdom
Czechia	Morocco	United States
Denmark	Myanmar	Uruguay
Dominican Republic	Namibia	Uzbekistan
Ecuador	Netherlands	Venezuela
Egypt	New Zealand	Vietnam
El Salvador	Nigeria	Zambia
Estonia	Norway	Zimbabwe
Finland	Oman	
France	Pakistan	
Georgia	Panama	
Germany	Paraguay	
Ghana	Peru	
Greece	Philippines	
Guam	Poland	
Guatemala	Portugal	
Honduras	Puerto Rico	

Table S4. Estimates based on Equation (2) using control variables from Table 1.

	A. Late campaign relative to first COVID-19 case in country				
	(1)	(2)	(3)	(4)	(5)
Post * Late Campaign	0.0487	0.0445	0.0475	0.0423	0.0498
RI p-value	0.000	0.000	0.000	0.004	0.000
Post	2.4288	1.3016	2.5721	1.6654	1.6481
RI p-value	0.000	0.000	0.000	0.000	0.000
Late Campaign	0.0130	0.0144	0.0226	0.0252	0.0191
RI p-value	0.088	0.042	0.006	0.004	0.006
Observations	16,080	16,080	16,080	16,080	16,080
R-squared	0.0678	0.0933	0.1421	0.1663	0.2036
Day FE		Yes		Yes	
Continent FE			Yes	Yes	
Continent FE * Day FE					Yes
	B. Late campaign relative to first COVID-19 death in country				
	(1)	(2)	(3)	(4)	(5)
Post * Late Campaign	0.0507	0.0420	0.0444	0.0345	0.0425
RI p-value	0.002	0.012	0.006	0.038	0.012
Post	3.6086	2.3706	3.5023	2.3504	2.5055
RI p-value	0.000	0.000	0.000	0.000	0.000
Late Campaign	0.0085	0.0118	0.0184	0.0235	0.0170
RI p-value	0.310	0.174	0.058	0.014	0.048
Observations	15,500	15,500	15,500	15,500	15,500
R-squared	0.0508	0.0754	0.1111	0.1356	0.1711
Day FE		Yes		Yes	
Continent FE			Yes	Yes	
Continent FE * Day FE					Yes

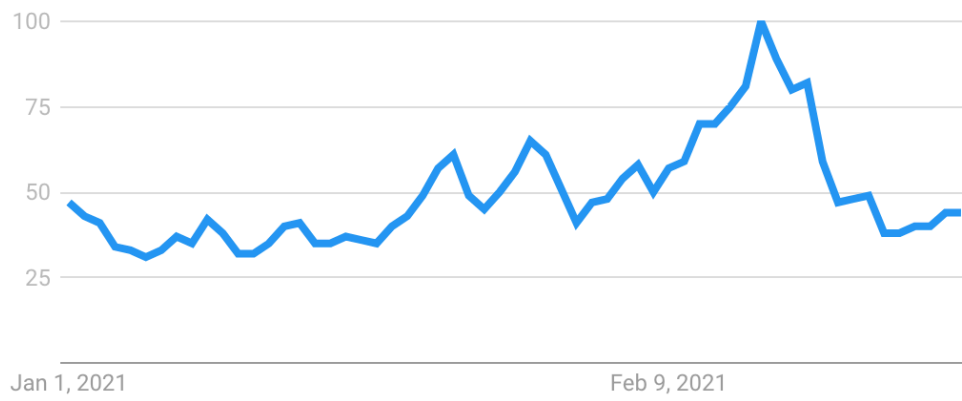
Table S5. Estimates based on Equation (2) using control variables from Table 2.

A. Late campaign relative to first COVID-19 case in country							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post * Late Campaign	0.0532	0.0509	0.0478	0.0547	0.0552	0.0441	0.0422
RI p-value	0.000	0.000	0.002	0.000	0.018	0.000	0.000
Post	0.6237	1.1719	1.5416	1.2018	0.9733	1.3582	1.3334
RI p-value	0.476	0.000	0.000	0.000	0.018	0.000	0.000
Late Campaign	0.0033	0.0067	0.0197	0.0093	0.0324	0.0204	0.0181
RI p-value	0.768	0.422	0.006	0.320	0.062	0.004	0.012
Covariates included:	ICRG	GDP	Democracy	Human capital	Schwartz Values	COVID-19 restrictions	COVID-19 cases
Observations	14775	15645	15355	14485	9120	16031	15500
R-squared	0.3389	0.2574	0.2302	0.266	0.3681	0.2544	0.2525
Continent FE * Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
B. Late campaign relative to first COVID-19 death in country							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post * Late Campaign	0.0481	0.0503	0.0420	0.0529	0.0443	0.0400	0.0368
RI p-value	0.000	0.000	0.016	0.000	0.118	0.022	0.028
Post	1.3981	2.0938	2.4648	2.2789	1.9023	2.2325	2.1204
RI p-value	0.056	0.000	0.000	0.000	0.044	0.000	0.000
Late Campaign	0.0072	0.0043	0.0192	0.0079	0.0500	0.0180	0.0174
RI p-value	0.562	0.662	0.026	0.442	0.018	0.044	0.048
Covariates included:	ICRG	GDP	Democracy	Human capital	Schwartz Values	COVID-19 restrictions	COVID-19 cases
Observations	14,340	15,065	14,775	13,905	8,830	15,451	14,920
R-squared	0.3294	0.2447	0.2020	0.2490	0.3612	0.2324	0.2328
Continent FE * Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table S6. List of countries and territories, with number of respondents, included in Study 3.

Country	N. respondents	Country	N. respondents
Argentina	635	Latvia	844
Australia	1793	Mexico	1094
Austria	1283	Morocco	545
Bangladesh	354	Nepal	314
Belgium	1074	Netherlands	1197
Bolivia	24	New Zealand	447
Brazil	1604	Nicaragua	12
Bulgaria	448	Nigeria	486
Canada	840	Norway	479
Chile	86	Pakistan	420
China	960	Panama	15
Colombia	1055	Paraguay	12
Costa Rica	21	Peru	79
Croatia	423	Philippines	442
Cuba	36	Poland	1497
Denmark	486	Romania	852
Dominican Rep.	32	Russia	470
Ecuador	118	Senegal	253
El Salvador	27	Serbia	620
Finland	616	Singapore	443
France	947	Slovakia	984
Germany	1397	South Africa	409
Ghana	81	South Korea	403
Greece	609	Spain	1019
Guatemala	40	Sweden	1473
Honduras	21	Switzerland	935
Hungary	437	Taiwan	685
India	564	Turkey	1239
Iraq	450	Ukraine	504
Ireland	684	United Kingdom	519
Israel	1158	United States	1124
Italy	1048	Uruguay	45
Japan	999	Venezuela	71

● Weather



United States. 1/1/21 - 2/28/21. Web Search.

Figure S1. Google searches for topic “Weather”, United States, January-February 2021.

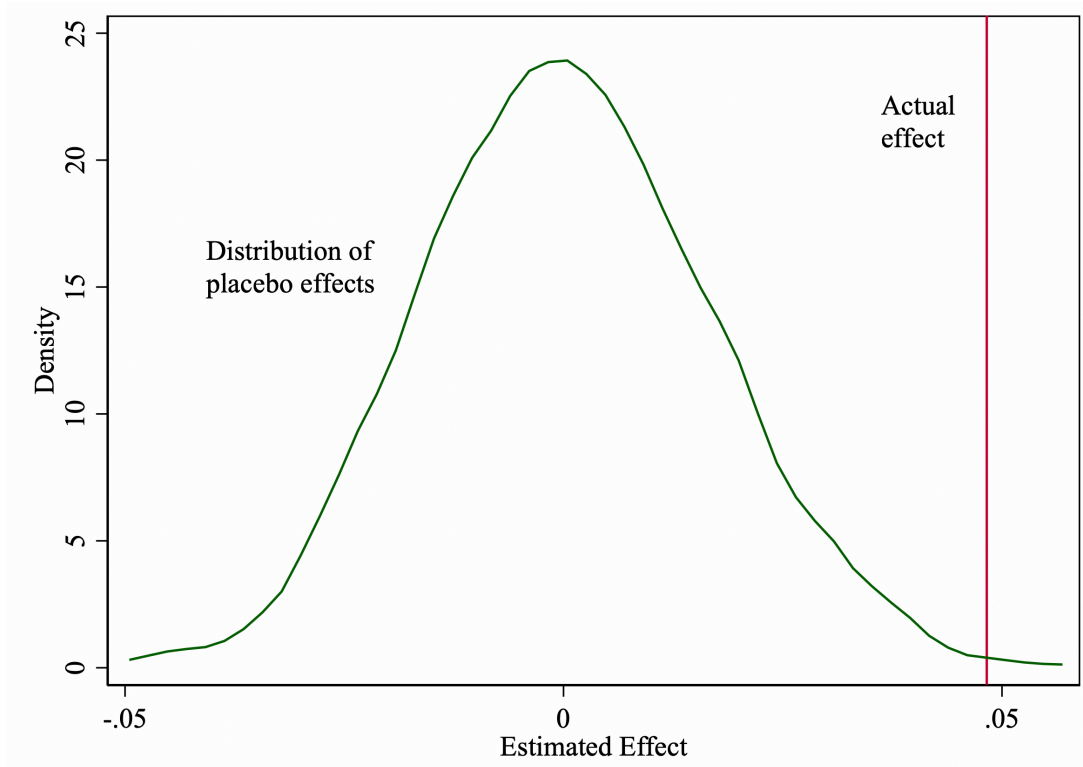


Figure S2. Randomization inference example: estimates from Table 1, Panel A, Model 1.

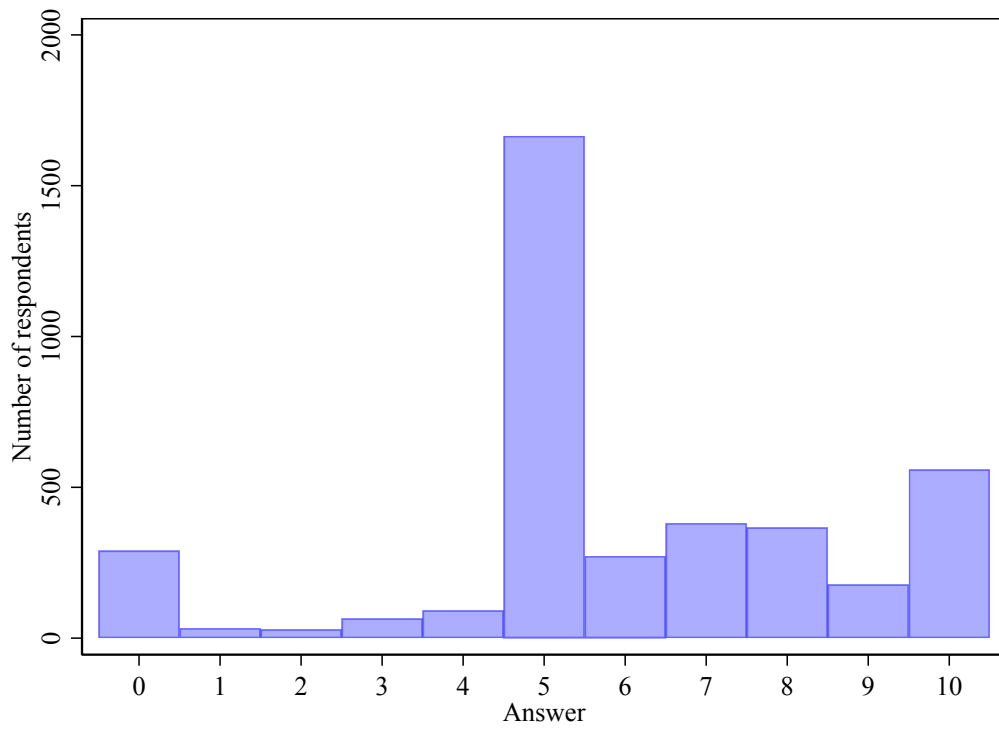


Figure S3. Identical responses to questions 1 and 4 from the moral identity block.

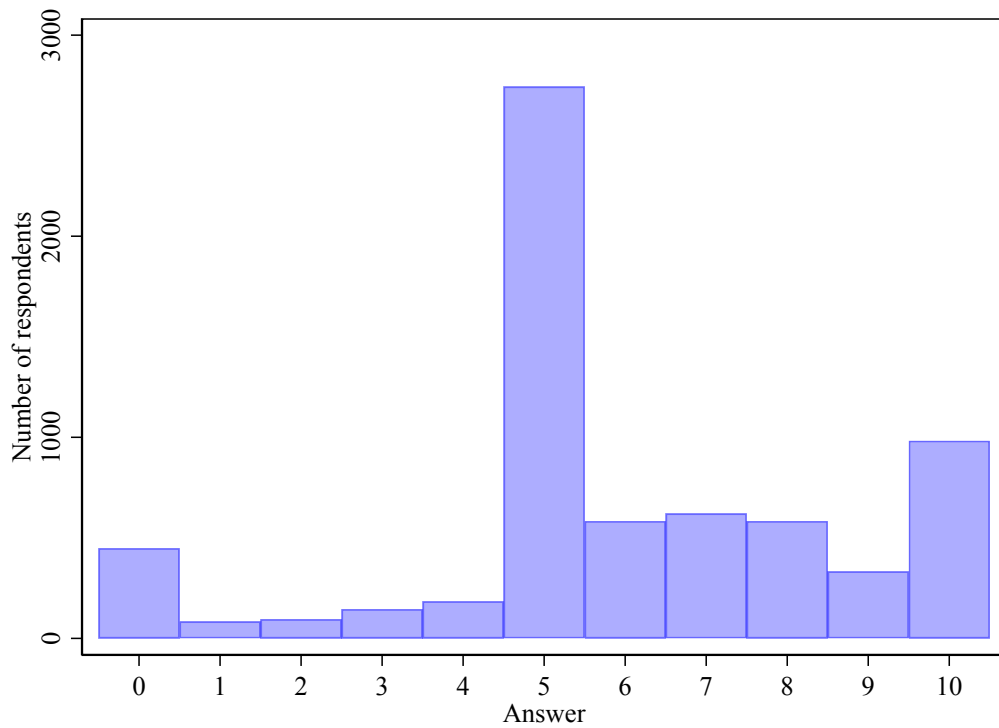


Figure S4. Identical responses to questions 7 and 10 from the moral identity block.

Notes to Figures S3 and S4

The preamble text for the moral identity block reads as follows:

“Listed below are some characteristics that might describe a person: caring, compassionate, fair, friendly, generous, helpful, hardworking, honest, kind. The person with these characteristics could be you or it could be someone else. For a moment, visualize in your mind the kind of person who has these characteristics. Imagine how that person would think, feel, and act. When you have a clear image of what this person would be like, answer the following questions.”

Question 1 asks the respondent to indicate, from 0 to 10, how much they agree with the statement:

“It would make me feel good to be a person who has these characteristics.”

Question 4 asks the respondent to indicate, from 0 to 10, how much they agree with the statement:

“I would be ashamed to be a person who had these characteristics.”

Figure S3 displays the number of respondents who responded with the same number to each of Questions 1 and 4. In our pre-registration, we stated that we would exclude respondents who answer both questions with the same numbers, as it is highly likely to mean that they are not reading the survey. One cannot possibly completely agree (10 out of 10) that it would make them feel good and also ashamed to have the characteristics described in the preamble.

We did not foresee, however, that several respondents would express middle-of-the-road (5 out of 10) opinions about these questions. The number of would-be “abnormal” 5 out of 10 responses is orders of magnitude larger than for other responses, suggesting that it is likely that many 5 out of 10 responses are genuine. Since we cannot tell apart genuine 5’s from inattentive 5’s, we keep these answers in the sample.

Figure S4 is analogous to Figure S3, for the following two statements (Questions 7 and 10 in the moral identity block respectively):

“Having these characteristics is not really important to me.”

“I strongly desire to have these characteristics.”

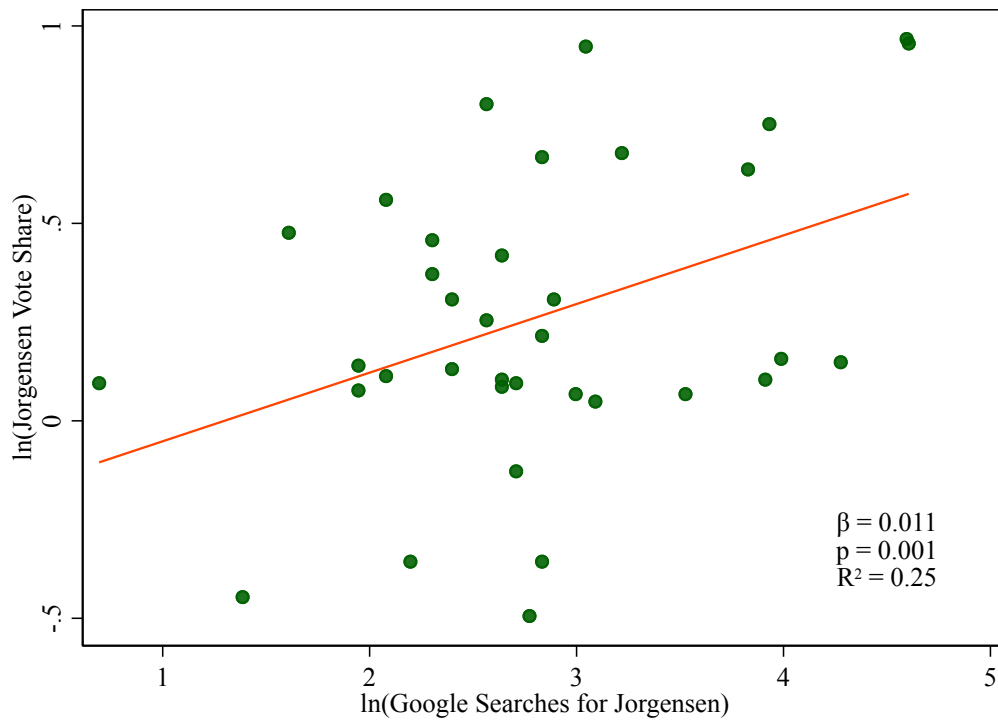


Figure S5. State-level Google searches for Jo Jorgensen (January 1 to November 2, 2020) predict Jo Jorgensen’s vote share on Election Day (November 3, 2020).

References

Bolt, J., & Van Zanden, J. L. (2014). The Maddison Project: collaborative research on historical national accounts. *The Economic History Review*, 67(3), 627-651.

Feenstra, R. C., Inklaar, R., & Timmer, M. P. (2015). The next generation of the Penn World Table. *American Economic Review*, 105(10), 3150-82.

Hale, T., Webster, S., Petherick, A., Phillips, T., & Kira, B. (2020). Oxford COVID-19 Government Response Tracker, Blavatnik School of Government. Data use policy: Creative Commons Attribution CC BY standard.

Marshall, M. G., Gurr, T. R., & Jagers, K. (2013). Polity IV project: Political regime characteristics and transitions, 1800–2012. *Center for Systemic Peace*.

PRS (2018). International Country Risk Guide: Guide to Data Variables. Available at: <https://epub.prsgroup.com/list-of-all-variable-definitions>.

Schwartz, S. (2006). A theory of cultural value orientations: Explication and applications. *Comparative Sociology*, 5(2-3), 137-182.

Van Bavel, J.J., Cichocka, A., Capraro, V., Sjästad, H., Nezlek, J.B., Pavlović T., Alfano A., Gelfand, M.J., Azevedo, F., Birtel M.D., Cislak, A., Lockwood, P., Ross, R. M., Stoyanova, K.K., Abts, K., Amodio, D.M., Apps, M. A.J., Aruta, J.J.B.R., Besharati, S., ..., Boggio, P. (2020). National identity predicts public health support during a global pandemic. Manuscript submitted for publication.